The 28-inch Refractor.

This instrument has been used throughout the year for micrometric measurements of double stars. The total number of double stars measured in the year is 382; of these 221 have components less than 1″·0 apart, and 120 less than 0″·5. The close pairs whose distance apart is less than 1″·0 have been measured on the average on three nights each, and the wider pairs on an average of two nights. The wider pairs consist of bright stars with a faint companion, of third companions to close pairs, and of stars of special interest.

In addition to the list of most difficult and interesting stars measured, it is stated that good series of measures have been obtained of κ Pegasi, δ Equulei, 70 Ophiuchi, and ζ Herculis. Capella also has been examined at every favourable opportunity.

Thompson Equatorial.

This instrument has been used chiefly for photographing Neptune and his satellite, and 52 measurable photographs were secured. With the 30-inch reflector long exposed photographs of Nova Persei were obtained, but unfortunately, owing to the object-glass of the guiding telescope not being quite firm in its cell, displacements during exposure occurred.

Astrographic Equatorial.

The photography for the Greenwich zone (Dec. + 64° to the Pole) having been practically completed, the work during the past year was directed to replacing such plates as were found to be inferior to the general standard. Four hundred and thirteen plates were taken, but of these fifty-seven were for various reasons rejected.

The report contains many details about the measurement of the plates, the counting of the number of stars, and various other preparations which would occupy too much space, but the following table may be given, as a good idea of the magnitude of the new work can be at once gathered:—

Limits of Declination.	Number of Stars Measured.	Number	Number in A.G.C.	A.G.C.
64°–65°	8,954	1,900	1,200	Helsingfors
65°–70°	49,210	7,782	3,700	Christiania
70°–75°	50,190	5,870	—	Dorpat
75°–77°	18,100	1,856	1,700	Kazan
77°–78° (oh. to 16h.)	5,430	613	420	,,

Spectroscopic and Heliographic Observations.

For the year 1901, Greenwich photographs have been selected for measurement on 149 days, and photographs from India and Mauritius (filling up gaps in the series) on 210 days, making a total of 359 days out of 365 on which photographs are at present available.

The proportion of days upon which the sun was entirely free from spots was 80 per cent. for the year 1901, and about the same proportion for 1902 to the date of this report. But the appearance of two considerable groups this year, and the high latitudes of the spots generally, are indications that the actual minimum is passed.

Magnetic Observations.

The variations of magnetic declination, horizontal force and vertical force, and of earth currents, have been registered photographically, and accompanying eye observations of absolute declination, horizontal force, and dip have been made as in former years. The regular determinations of magnetic declination, horizontal force, and dip have been made with the new declinometer, the Gibson deflection instrument, and the Airy dip circle mounted in the Magnetic Pavilion.

The principal results for the magnetic elements for 1901 are as follow:—

Mean declination ... ... 16° 26′·0 West.
Mean horizontal force ... 4·0082 (in British units). 1·8481 (in metric units).
Mean dip (with 3-inch needles) ... 67° 6′ 5″.

These results depend on observations made in the new Magnetic Pavilion, and are free from any disturbing effect of iron.

The magnetic disturbances in 1901 have been small and few in number. There were no days of great magnetic disturbance and 8 of lesser disturbance.

Meteorological Observations.

The registration of atmospheric pressure, temperature of the air, and of evaporation, pressure and velocity of the wind, rainfall, sunshine and atmospheric electricity has been continuously maintained.

The mean temperature for the year 1901 was 49°·3, being 0°·2 below the average for the fifty years 1841–90.

During the twelve months ending 1902 April 30, the highest temperature in the shade (recorded on the open stand in the Magnetic Pavilion enclosure) was 87°·9 on July 19. The highest temperature recorded in the Stevenson screen in the enclosure was 86°·0, and in that in the Observatory grounds 87°·1 on the same day.

The lowest temperature of the air recorded in the year was 14°·3, on February 16. During the winter there were 52 days on which the temperature fell below 32°, a number slightly below the average.

The low temperature in February is the lowest temperature recorded in that month since 1895, when, on February 8, the minimum February temperature 6°·9 occurred.

The number of hours of bright sunshine recorded during the twelve months ending 1902 April 30, by the Campbell-Stokes instrument, was 1519 out of 4457 hours during which the sun was above the horizon, so that the mean proportion of sunshine for the year was 0·341, constant sunshine being represented by 1.

The rainfall for the year ending 1902 April 30 was 17·89 inches, being 6·65 inches less than the average of fifty years. The number of rainy days was 116. The rainfall has been less than the average in each year since 1894. The total deficiency of rainfall for the seven years ending 1901 December 31 amounts to 23·70 inches.

The remaining portion of the report deals with the printing and distribution of the Greenwich publications, the examination of chronometers, time-signals, &c.

A short reference is made to the re-determination of the Greenwich-Paris longitude, and to the expedition which went out to Sumatra and Mauritius to observe the total solar eclipse of May 18, 1901.

EVIDENCE OF A "SEICHE" ON A SCOTTISH LOCH.

WHILE engaged in the survey of Loch Trieg, Inverness-shire, on May 22, Dr. T. N. Johnston and Mr. J. Parsons, of the British Lakes Survey, observed what appears to be an undoubted *seiche*, *i.e.* a periodic variation in the level of a lake, considered by Prof. Forel, among others, to be due to sudden changes in barometric pressure, whilst others, again, consider them due to earth-movements.

The attention of Dr. Johnston was first drawn to the phenomenon by observing that certain small stones near the shore were covered and uncovered at regular intervals, the surface of the loch being perfectly calm at the time, and had been so during the day.

At a quarter to 9 p.m., a foot rule was placed vertically in the water and the surface level observed at intervals of one minute for forty minutes.

The results obtained confirmed the rougher observation that the surface of the water was undergoing slow oscillations.

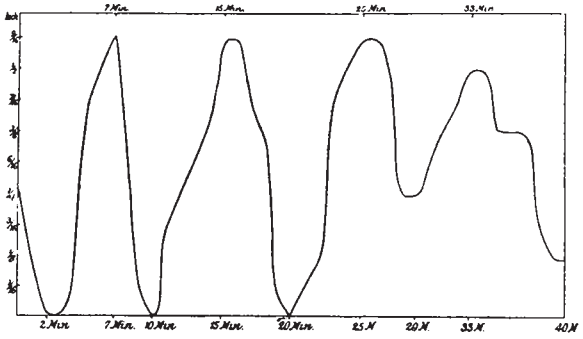
The amplitude of the wave proved to be $\frac{9}{16}$ inch, and the period, *i.e.* the time taken in rising from the lowest to the highest level and falling again, averaged 9·5 minutes.

Despite the smallness of the amplitude compared to that noticed on the Lake of Geneva and other lakes, the observers had no doubt that the movements were not due to surface ripples.

Loch Trieg is about six miles long and three-quarters of a mile wide, its longer axis lying nearly north and south. The survey of the loch is now completed, and a depth of 436 feet has been found within two miles of the southern extremity.

Should this variation of level prove to be a true *seiche* it will

be the first recorded on a Scottish loch, with the possible exception of a considerable rise and fall of the water of Loch Tay in 1784, which has been considered an example of this phenomenon.



The accompanying curve represents the variations in level observed on Loch Trieg, the ordinates representing periods of one minute and the abscissæ changes of $\frac{1}{16}$ inch in the level.

THE MINING STATISTICS OF THE WORLD.

OWING to the lack of uniformity and the want of completeness in the official statistics published in the countries where mining and quarrying are carried on, the compilation of the mineral statistics of the world is a task of extreme difficulty. The work is, however, carried out every year with conspicuous success by Prof. C. Le Neve Foster, F.R.S., in the Home Office general report on mines and quarries. The fourth part of this report, which has recently been issued, deals with the colonial and foreign statistics for 1900, and constitutes a work of reference of permanent value. It is impossible to imagine a more concise, a better arranged, or a more inexpensive collection of comparative mineral statistics. Last year's report was noticed at length in NATURE (April 4, 1901, p. 551), and as the general arrangement has been closely followed in the new issue, the nature of the work may best be called to mind by citing a few of the more important figures that furnish a comparison as regards labour, output and safety in various parts of the world.

The following figures are given for the world's mineral production in 1900 :—

	The World.	British Empire.	United Kingdom.	United States.
Coal, metric tons ...	767,636,204	247,938,725	228,794,919	244,901,839
Iron, metric tons ...	40,427,435	4,987,641	4,741,835	14,014,475
Copper, metric tons..	534,735	41,456	777	275,008
Lead, metric tons ...	787,841	73,203	24,755	245,757
Tin, metric tons ...	80,643	51,624	4,336	—
Zinc, metric tons ...	446,373	13,417	9,211	112,419
Petroleum, metric tons...	18,553,950	241,344	—	7,485,579
Salt, metric tons ...	12,572,076	3,131,029	1,891,217	2,650,075
Fine gold, kilogrammes	393,196	188,491	415	119,913
Fine silver, kilogrammes	5,874,284	582,932	5,936	1,862,829

The figures given show that although Great Britain has had for a second time to give to the United States the first place in the production of coal, the British Empire as a whole is still the largest producer of solid mineral fuel, yielding nearly one-third of the world's output. The gold output of the British Empire is also the largest, and will probably increase. The United States, however, comes first in the production of the ores of copper, iron and lead. The German Empire, with 153,350 tons, is the largest zinc producer, and Russia, with 9,827,822 tons, is the largest producer of petroleum. Thanks to Tasmania and the Federated Malay States, the British Empire possesses the most productive deposits of tin ore.

The comparison of the figures relating to labour gives some interesting results. In 1900 the number of persons employed in the mines and quarries of the various countries was as follows :—The world 4,475,355, the British Empire 2,883,200, the United Kingdom 908,412, the United States 506,830 (returns incomplete), Germany 733,683, France 309,815, Belgium 171,467, Austria-Hungary 226,330, Russia 286,983, Italy 102,728, and Japan 119,667.

As regards the safety of its miners, Great Britain takes a high place. The number of fatal accidents in collieries per 1000 persons employed was as follows in the year under review :—Great Britain 1·29, Germany 2·19, Austria 1·08, France 1·42, Belgium 1·05, and United States 3·29 In the United States the death rate, both in bituminous coal mines and in anthracite mines, is considerably higher than in the United Kingdom. The rapid extension of machine mining in the United States is very remarkable. In 1891, it is stated, only 6·7 per cent. of the output of bituminous coal was obtained by the aid of coal-cutting machinery ; in 1900 the proportion had risen to 25 per cent.

The abundant and accurate references to current literature given in footnotes form a very valuable feature of the report. Hundreds of books, pamphlets and newspapers in various languages have been consulted, and much interesting information derived from them is recorded.

In one or two cases, statements are quoted that are, perhaps, open to criticism. For example, the statement that Dr. Carl Peters gives many excellent reasons for supposing that Macombe's country, south of the Zambesi, in Portuguese East Africa, is the Ophir of Scripture hardly gives a correct impression of the prolonged controversy as to the site of Ophir. Moreover, so competent an authority as Prof. A. H. Keane has recently decided in favour of the south of Arabia. Ophir, he shows, was not the place at which the gold, to which it gave its name, was found ; it was the emporium to which the products of the east and south were brought and from which they were distributed. Another statement which is not strictly accurate is that the yield of the oil wells of the United States almost equals that of all the rest of the world put together. In view of the fact that the Russian output is given as 2,342,243 metric tons more than that of the United States, this statement is somewhat misleading.

It is interesting to note the effect of the war in South Africa on the mineral production. In the Transvaal the output of gold was small; and in Natal until March 1900 all the collieries were in the possession of the invaders, the output of coal being consequently comparatively small. In the Orange River Colony mining was carried on under very great difficulties and upon a very reduced scale. In Cape Colony the siege of Kimberley and the war generally interfered greatly with mining. In Rhodesia, however, the output of gold showed a steady increase, and the future prospects of the industry have been much brightened by the discovery of rich deposits of coal. In the Wankie coalfield alone, which lies 190 miles north-west of Buluwayo, the workable seams are considered capable of yielding 1500 million tons of coal.

It is impossible within the limits of this notice to refer to all the points of interest suggested by the report; but enough has been said to show to how wide a circle of readers this invaluable work of reference appeals. B. H. B.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—An examination for one geographical scholarship of the value of 60*l.* will be held on October 14. Candidates, who must have taken honours in one of the final schools of the University, should send in their names to the Reader in geography not later than October 1. The scholar elected will be required to attend the full course of instruction at the school of geography during the academic year 1902–1903, and to enter for the University diploma in geography in June, 1903.

CAMBRIDGE.—The Mathematical Tripos list, Part i., was published on June 10. The senior wrangler this year is Mr. E. Cunningham, St. John's College. Mr. F. Slator, also of St. John's, is the second wrangler.

The Rede lecture was delivered in the Senate House on June 10 by Prof. Osborne Reynolds, F.R.S., the subject being "On an Inversion of Ideas as to the Structure of the Universe."